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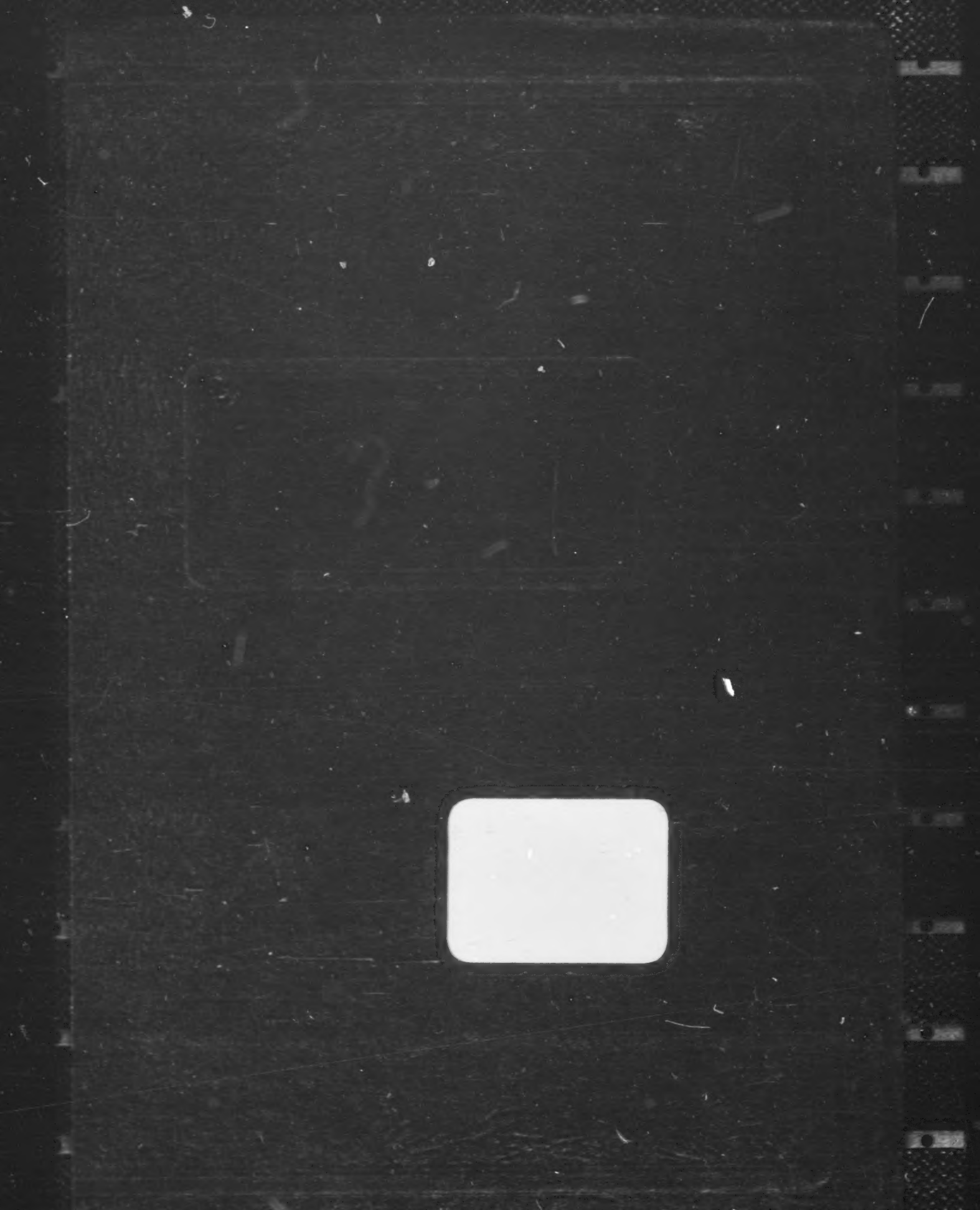
ABSTRACT

The Bio-Med Instrumentation Technologist Questionnaire was sent to 105 hospitals in the Southern California area that had electronic instrumentation for patient monitoring purposes. Sixty completed questionnaires were returned. Twenty manufacturers of bio-medical instrumentation were sent the questionnaires and seven responded. Some of the conclusions presented were: (1) 35 percent of the hospital respondees expect BMIT employment opportunities to increase while none expect a decrease in employment; (2) for those that employed BMIT types the "sources of employable individuals" varied evenly among military, aerospace, public technical schools, and private technical schools; (3) no standardized level of education is at present required for employment; (4) clinical laboratory equipment was the most prevalently serviced followed by patient monitoring equipment and research instrumentation; (5) twenty-six percent of the respondees indicated they would be interested in employing an individual who has completed a program in BMIT, 52 percent might be interested; (6) the majority of the respondees (72 percent) would encourage their present employees enrolling in such a program; (7) present employees are not attending any type of formalized BMIT program; (8) thirty percent rated the outline of the proposed introductory course as excellent, 48 percent satisfactory. (Author/DS)



ED 089075

SURVEY OF HOSPITALS AND MANUFACTURERS OF BIO-MEDICAL INSTRUMENTATION CONCERNING VARIABLES RELATED TO THE DEVELOPMENT AND IMPLEMENTATION OF A BIO-MED INSTRUMENTATION TECHNOLOGIST CURRICULUM

Office of
Institutional Research
Cerritos College
JANUARY, 1974

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Research Director

CE001128

ABSTRACT

The Bio-Med Instrumentation Technologist Questionnaire was sent to 105 hospitals in the Southern California area that had electronic instrumentation for patient monitoring purposes. Sixty or 57% of the 105 hospitals returned a completed questionnaire. In addition this same questionnaire was sent to 20 manufacturers of bio-medical instrumentation. Seven or 35 percent of those contacted returned a completed questionnaire.

Some of the conclusions presented were: (1) Concerning future employment opportunities in the area of BMIT it was found that 35% of the hospital respondees expect BMIT employment opportunities to increase while none expect a decrease in BMIT employment; (2) For those that employed BMIT types the "sources of employable individuals" varied about evenly between military (12%), aerospace (11%), public technical schools (14%), and private technical schools (12%); (3) The reaction to "What is the educational level presently required of a BMIT technician for initial employment at your facility" was extremely varied and would lead one to conclude that at present there are no standardized requirements; (4) Concerning occupational skills needed by BMI technicians it was found that clinical laboratory equipment was the most prevalently serviced followed by patient monitoring equipment and research instrumentation; (5) Twenty-six percent (26%) of the respondees indicated they would be interested in employing an individual who has completed a program in BMIT, fifty-two percent (52%) "Maybe"; (6) The majority of the respondees (72%) would encourage their present employees to enroll in a BMIT program if it existed; (7) Present employees are not attending any type of formalized BMIT training program; (8) Thirty percent (30%) rated the outline of the proposed introductory course as "Excellent", 48% rated it "Satisfactory" and, 22% did not answer.

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INTRODUCTION

The Bio-Med Instrumentation Technologist Questionnaire was sent to 105 hospitals in the Southern California area. To be included in the sample of hospitals surveyed a hospital had to have electronic instrumentation for patient monitoring purposes.

Approximately two weeks after the initial mailing of the questionnaires a follow-up letter and another copy of the questionnaire was sent to each of the hospitals that had not yet responded. A month after the follow-up letter was mailed over 60% of the hospitals contacted had responded in some way, and 60 or 57% of the 105 had returned a completed questionnaire.

In addition this same questionnaire was sent to 20 manufacturers of bio-medical instrumentation. Seven or 35 percent of those contacted returned a completed questionnaire.

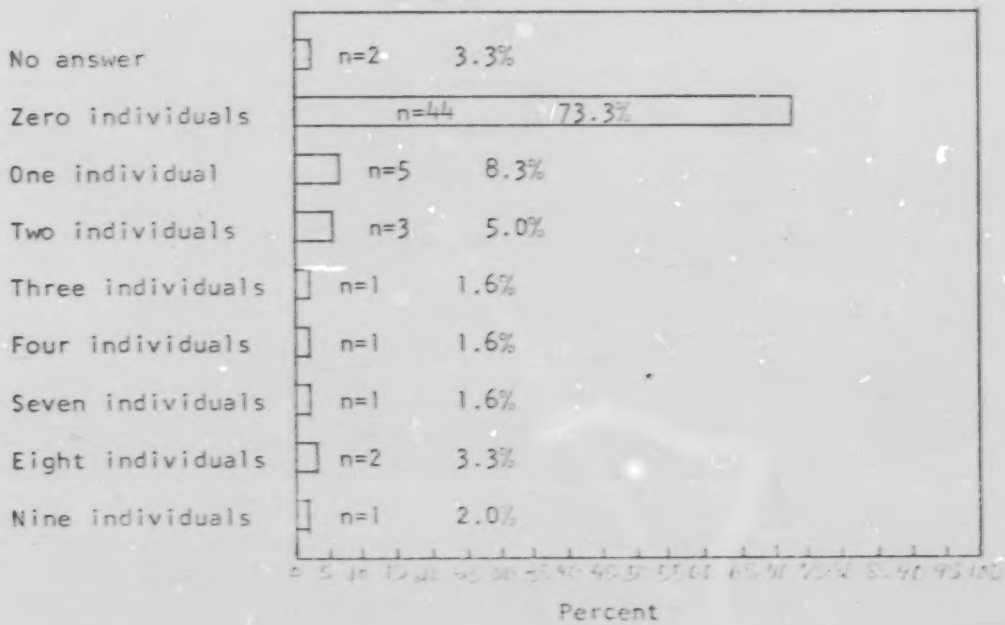
The results and analyses of the Bio-Med Instrumentation Technologist Survey are presented on the following pages.

Analysis 1: Items 1 through 12 across those 60 hospitals who returned a completed questionnaire.

Item 1

How many individuals do you presently employ in the area of Bio-Med Instrumentation Technology (BMIT)?

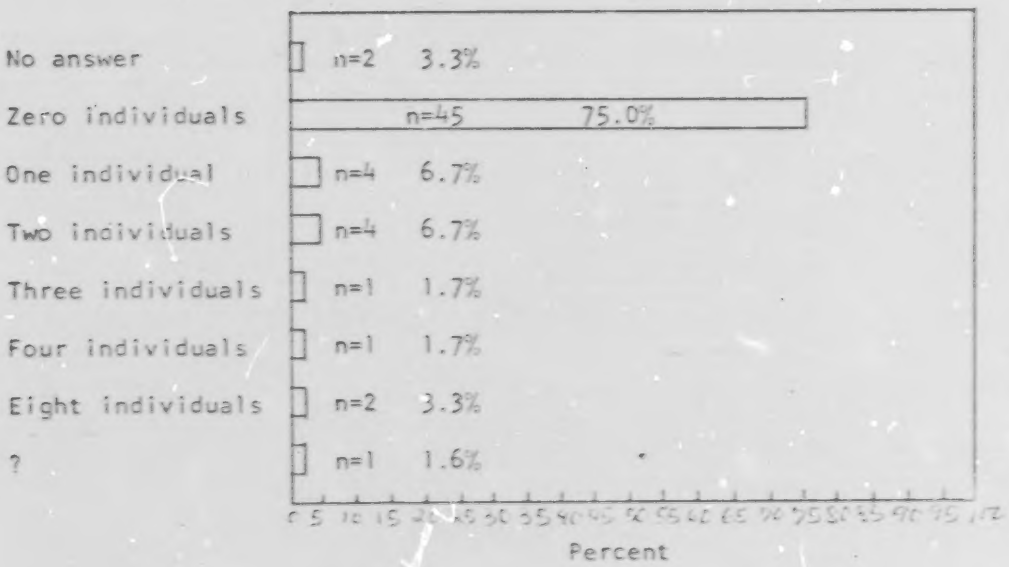
Categories of Answers	Number of Responses	Percentage
No answer	2	3.3%
Zero (0) individuals	44	73.3%
One (1) individual	5	8.3%
Two (2) individuals	3	5.0%
Three (3) individuals	1	1.6%
Four (4) individuals	1	1.6%
Seven (7) individuals	1	1.6%
Eight (8) individuals	2	3.3%
Nine (9) individuals	1	2.0%
Total	60	100.0%



Item 2

How many do you anticipate employing within the next year?

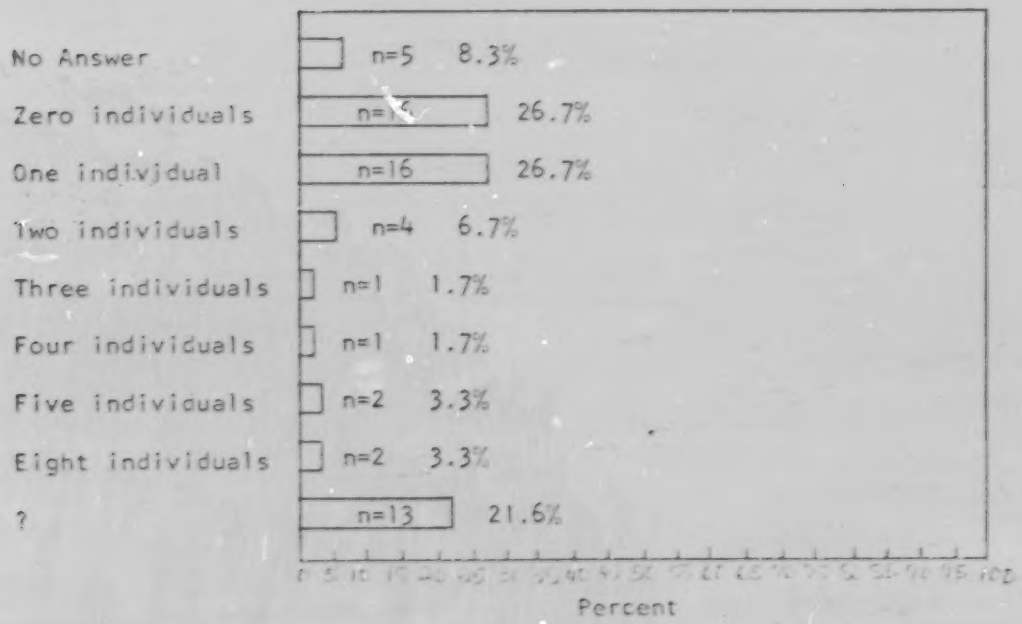
Categories of Answers	Number of Responses	Percentage
No answer	2	3.3%
Zero (0) individuals	45	75.0%
One (1) individual	4	6.7%
Two (2) individuals	4	6.7%
Three (3) individuals	1	1.7%
Four (4) individuals	1	1.7%
Eight (8) individuals	2	3.3%
?	1	1.6%
Total	60	100.0%



Item 3

How many within the next five years?

Categories of Answers	Number of Responses	Percentage
No answer	5	8.3%
Zero (0) individuals	16	26.7%
One (1) individual	16	26.7%
Two (2) individuals	4	6.7%
Three (3) individuals	1	1.7%
Four (4) individuals	1	1.7%
Five (5) individuals	2	3.3%
Eight (8) individuals	2	3.3%
?	13	21.6%
Total	60	100.0%



Concerning Items 1, 2, and 3, it was noted that <u>within a year</u>:

- Seven (7) or 11.8% expect an increase in BMIT employment
- Fifty (50) or 83.3% expect BMIT employment to remain the same
- None expect a decrease in BMIT employment
- One (1) or 1.7% was not sure (?)
- Two (2) or 3.3% did not answer

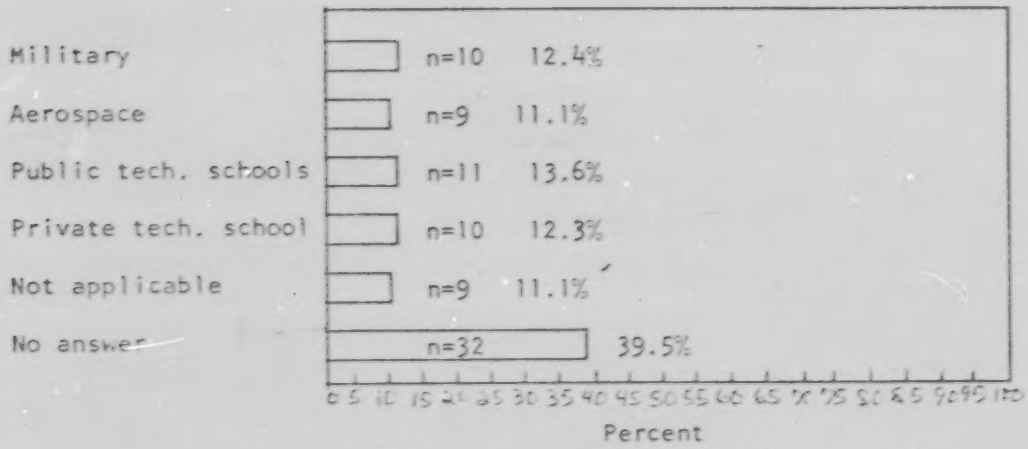
Again concerning Items 1, 2, and 3, it was found that <u>within the next five years</u>:

- Twenty-one (21) or 35.0% expect an increase in BMIT employment
- Twenty-one (21) or 35.0% expect BMIT employment to remain the same
- None expect a decrease in BMIT employment
- Thirteen (13) or 21.7% were not sure (?)
- Five (5) or 8.3% did not answer

Item 4

Present sources of employable individuals?

Categories of Answers	Number of Responses	Percentage
Military	10	12.4%
Aerospace	9	11.1%
Public technical schools	11	13.6%
Private technical schools	10	12.3%
Not applicable	9	11.1%
No answer	32	39.5%
Total	81	100.0%



Item 5

What is the educational level presently required of a BMI technician for initial employment at your facility?

No answer - 29

Not applicable - 7

"Bachelor of Science"

"Four years technical school/2 yrs on job training"

"College graduate with state license"

"Licensed medical technicians only"

"Bachelor of Science in medical technology or related field"

"College degree, one year internship, and state license"

"Bachelor of Science but no formal requirement"

"Two years college/two years experience"

"Two-four years of college"

"Experience and college"

"Two years college and at least 4 years field experience"

"High school graduate with experience"

"Clinical lab technician with state license"

"High school plus military or trade school electronics"

"High school and medical assisting school (not necessary)"

"Approximately 15 years engineering background"

"One engineer in charge - some electrical background for assistant"

"We use Instrumation Service at this time"

"Do not believe it is standardized"

"No fixed requirements (confused area)"

Item 5 (continued)

"Unknown"

"Not established as job category"

"?"

"?"

Occupational skills needed by a BMI technician at your facility. Please check any of the following items that are applicable.

Patient Monitoring Equipment:
*(Percent of total responses 27.2%)

	Number of Responses	Percentage
Installation	14	14.7%
Operation	15	15.8%
Minor Cal. & Adjustment	18	19.0%
Major Cal. & Adjustment	16	16.8%
Minor Equip. Repair & Maint.	18	19.0%
Major Equip. Repair & Maint.	14	14.7%
	95	100.0%

Clinical Laboratory Equipment:
*(Percent of total responses 54.5%)

	Number of Responses	Percentage
Installation	26	13.7%
Operation	25	13.2%
Minor Cal. & Adjustment	34	17.9%
Major Cal. & Adjustment	33	17.4%
Minor Equip. Repair & Maint.	40	21.0%
Major Equip. Repair & Maint.	32	16.8%
	190	100.0%

Research Instrumentation: *(Percent of total responses 18.3%)

	Number of Responses	Percentage
Installation	9	14.0%
Operation	9	14.0%
Minor Cal. & Adjustment	12	18.8%
Major Cal. & Adjustment	11	17.3%
Minor Equip. Repair & Maint.	13	20.3%
Major Equip. Repair & Maint.	10	15.6%
	64	100.0%

Item 7

What are some of the specific problems presently encountered by BMI technicians employed at your facility?

No answers - 31

Not applicable - 11

"Variety of designs, models, and manufacturers."

"Ground detector system, surjury electronics equipment, intensive care equipment."

"Training technicians in physiology and terminology and trouble shooting terminology."

"Poor knowledge of instrumentation."

"Medical technicians have no instrumentation training."

"Lack of knowledge on specific instruments."

"Mostly maintenance - calibration of instruments."

"Most work on a "Stat" demand basis."

"Major problems taken care of by company we contact."

"Lack of money for test equipment."

"Females have little knowledge of fundamental use of electronics."

"Don't know relationship of equipment to examination."

"Maintenance, re-supply, service, calibration."

"Work that can't be accomplished by electronics shop is contracted out."

"Unable to obtain schematics and parts for specialized equipment."

"Not established as a job category."

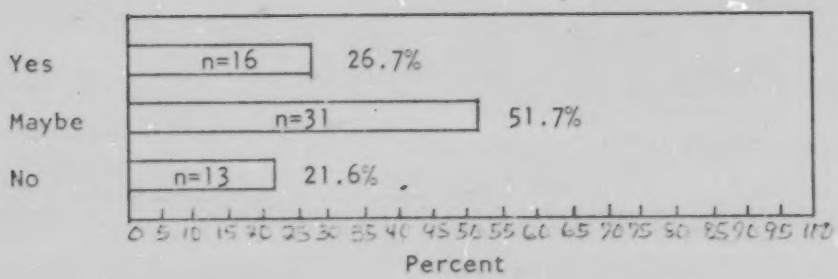
"Changing technology would require good basis with refresher courses."

"Reluctance of manufacturers to provide proper schematics and maintenance manuals."

Item 8

Would you be interested in employing an individual who has completed a program in BMIT?

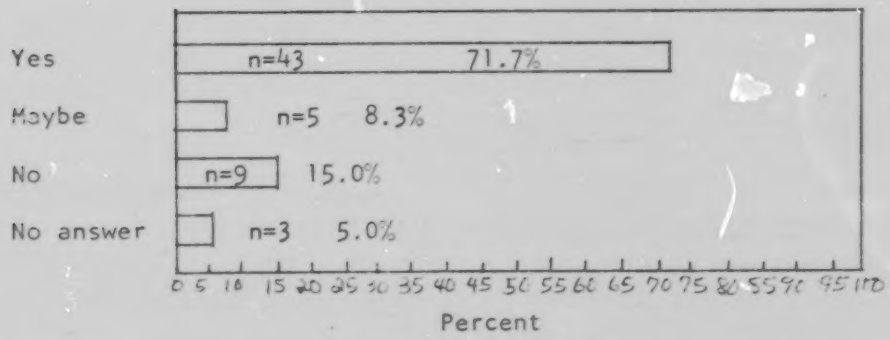
Categories of Answers	Number of Responses	Percentage
Yes	16	26.7%
Maybe	31	51.7%
No	13	21.6%
Total	60	100.0%



Item 9

Would you encourage your present employees to enroll in a BMIT program if it existed?

Categories of Answers	Number of Responses	Percentage
Yes	43	71.7%
Maybe	5	8.3%
No	9	15.0%
No Answer	3	5.0%
Total	60	100.0%

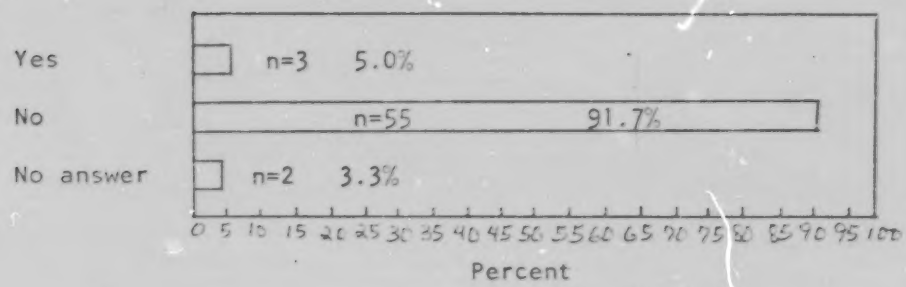


Item 10

Are any of your employees presently attending some type of formalized BMIT training program?

Categories of Answers	Number of Responses	Percentage
Yes	3*	5.0%
No	55	91.7%
No answer	2	3.3%
Total	60	100.0%

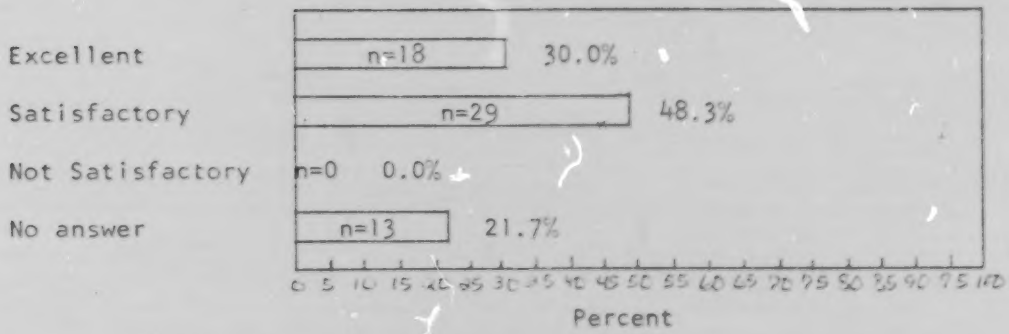
* 1 - UCLA; 1 - Valley C.; 1 - "Company school".



Item 11

Please rate the attached outline of a proposed introductory course.

Categories of Answers	Number of Responses	Percentage
Excellent	18	30.0%
Satisfactory	29	48.3%
Not Satisfactory	0	0.0%
No answer	13	21.7%
Total	60	100.0%



Item 12

Please suggest major courses in the Bio-Medical area and related fields such as electronics which should make up the major two year program. (The responses to this question may be found in Appendix B.)

Analysis 2: Items 1 through 3, 5, 8, 9, 10, 11, as a function of hospital size i.e. 0-50 (beds), 50-100, 100-200, 200-500, and over 500 beds.

Item 1

How many individuals do you presently employ in the area of Bio-Med Instrumentation Technology (BMIT)?

0-50 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	1	33.3%
Zero (0) individuals	2	66.7%
Total	3	100.0%

50-100 Beds

Categories of Answers	Number of Responses	Percentage
Zero (0) individuals	15	88.2%
One (1) individual	1	5.9%
Seven (7) individuals	1	5.9%
Total	17	100.0%

100-200 Beds

Categories of Answers	Number of Responses	Percentage
Zero (0) individuals	15	75.0%
One (1) individual	2	10.0%
Two (2) individuals	1	5.0%
Three (3) individuals	1	5.0%
Nine (9) individuals	1	5.0%
Total	20	100.0%

200-500 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	1	6.3%
Zero (0) individuals	10	62.5%
One (1) individual	2	12.5%
Two (2) individuals	1	6.3%
Four (4) individuals	1	6.2%
Eight (8) individuals	1	6.2%
Total	16	100.0%

Over 500 Beds

Categories of Answers	Number of Responses	Percentage
Zero (0) individuals	2	50.0%
Two (2) individuals	1	25.0%
Eight (8) individuals	1	25.0%
Total	4	100.0%

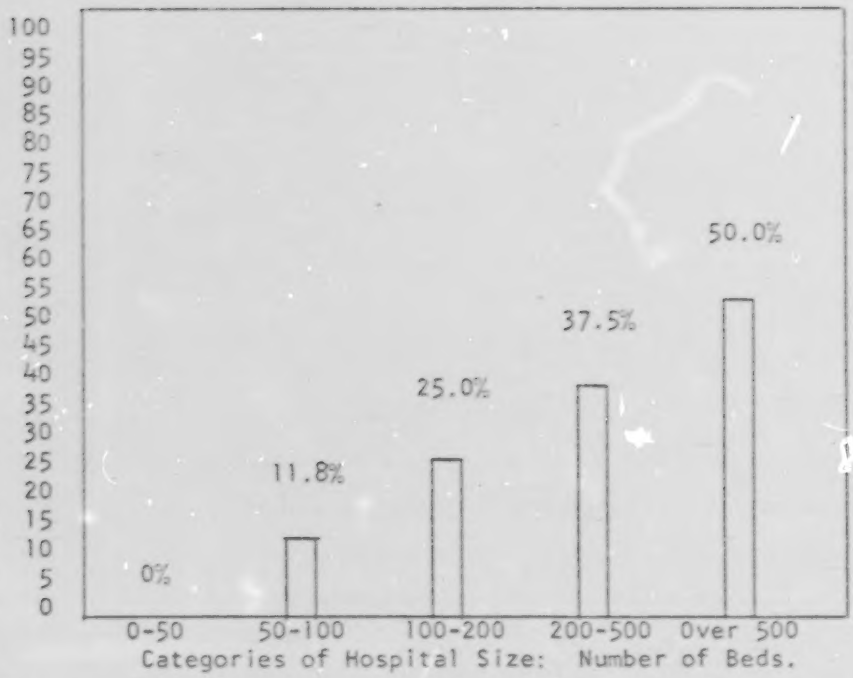


Figure 1. Percentage of one (1) or more individuals employed in the area of BMIT as a function of hospital size.

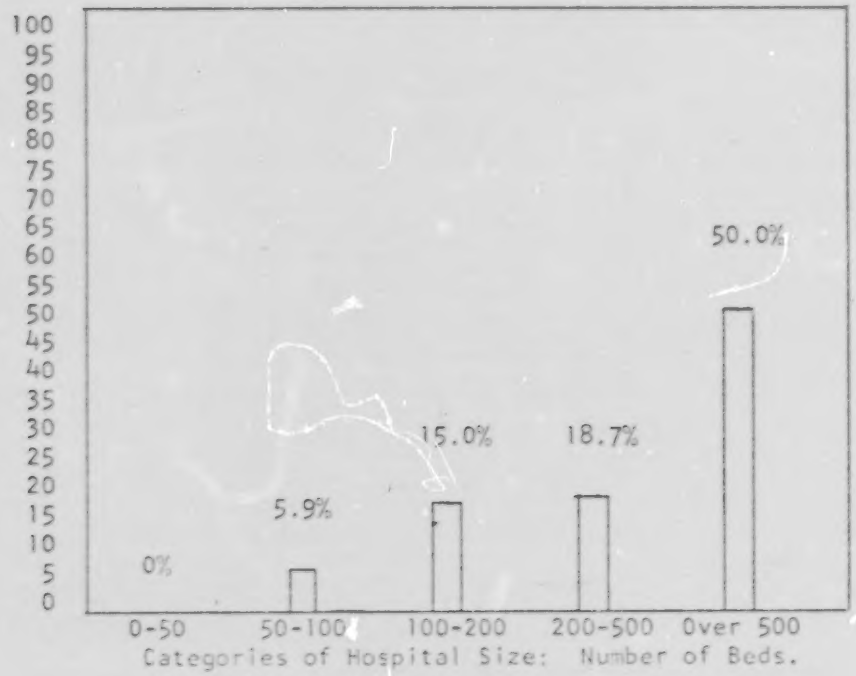


Figure 2. Percentage of two(2) or more individuals employed in the area of BMIT as a function of hospital size.

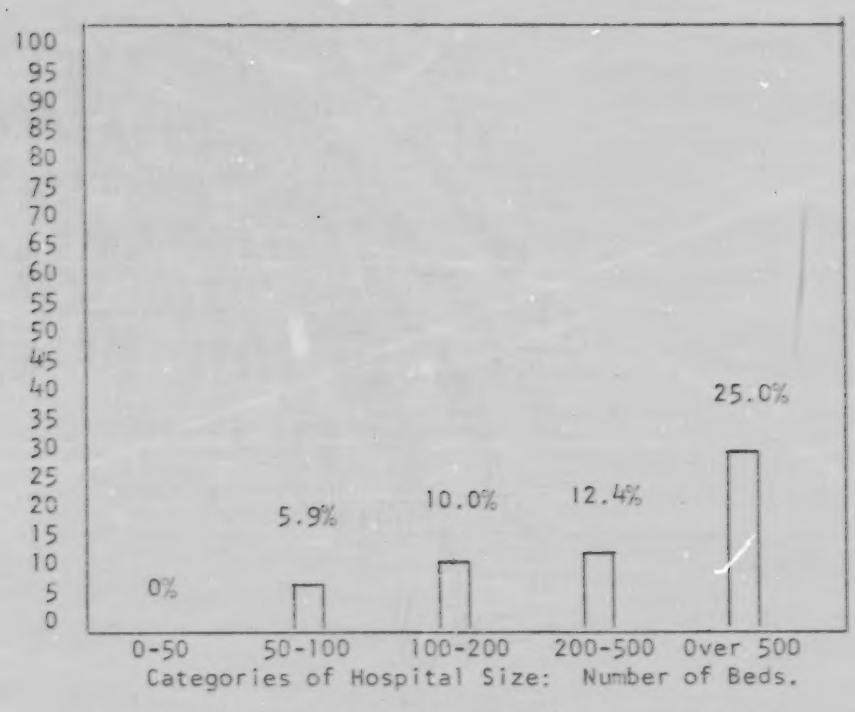


Figure 3. Percentage of three (3) or more individuals employed in the area of BMIT as a function of hospital size.

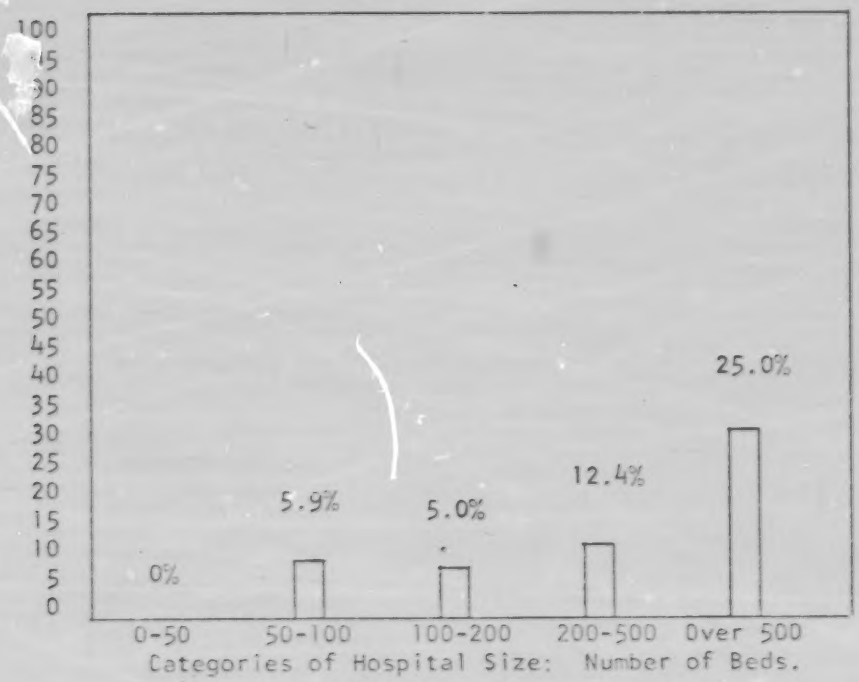


Figure 4. Percentage of four (4) or more individuals employed in the area of BMIT as a function of hospital size.

Item 2

How many BMIT individuals do you anticipate employing within the next year?

0-50 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	1	33.3%
Zero (0) individuals	2	66.7%
Total	3	100.0%

50-100 Beds

Categories of Answers	Number of Responses	Percentage
Zero (0) individuals	15	88.2%
Two (2) individuals	1	5.9%
Three (3) individuals	1	5.9%
Total	17	100.0%

100-200 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	1	5.0%
Zero (0) individuals	16	80.0%
One (1) individual	2	10.0%
Two (2) individuals	1	5.0%
Total	20	100.0%

200-500 Beds

Categories of Answers	Number of Responses	Percentage
Zero (0) individuals	10	62.5%
One (1) individual	1	6.2%
Two (2) individuals	2	12.5%
Four (4) individuals	1	6.3%
Eight (8) individuals	1	6.3%
?	1	6.2%
Total	16	100.0%

Over 500 Beds

Categories of Answers	Number of Responses	Percentage
Zero (0) individuals	2	50.0%
One (1) individual	1	25.0%
Eight (8) individuals	1	25.0%
Total	4	100.0%

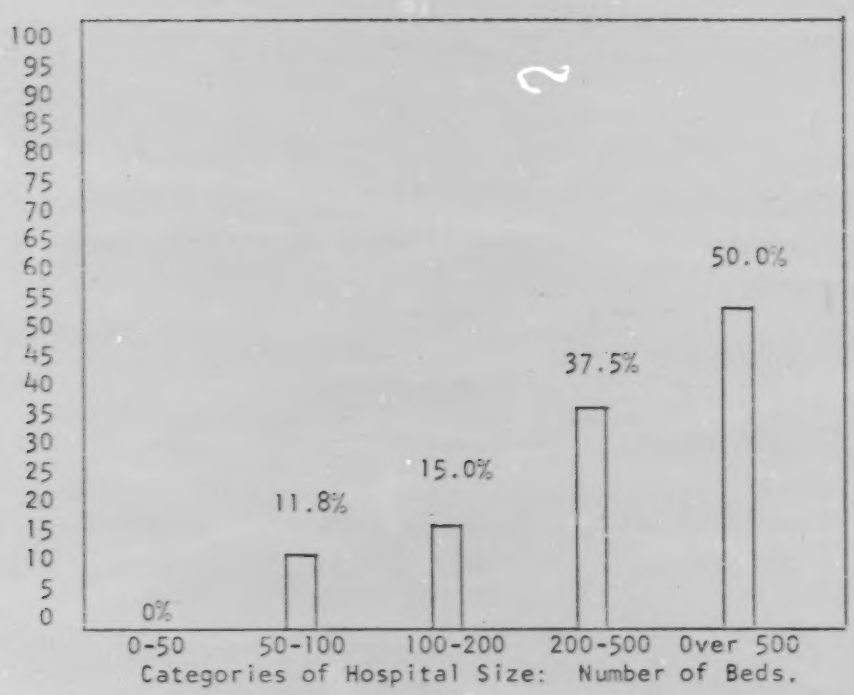


Figure 5. Percentage of one (1) or more BMIT individuals anticipated to be employed within the next year as a function of hospital size.

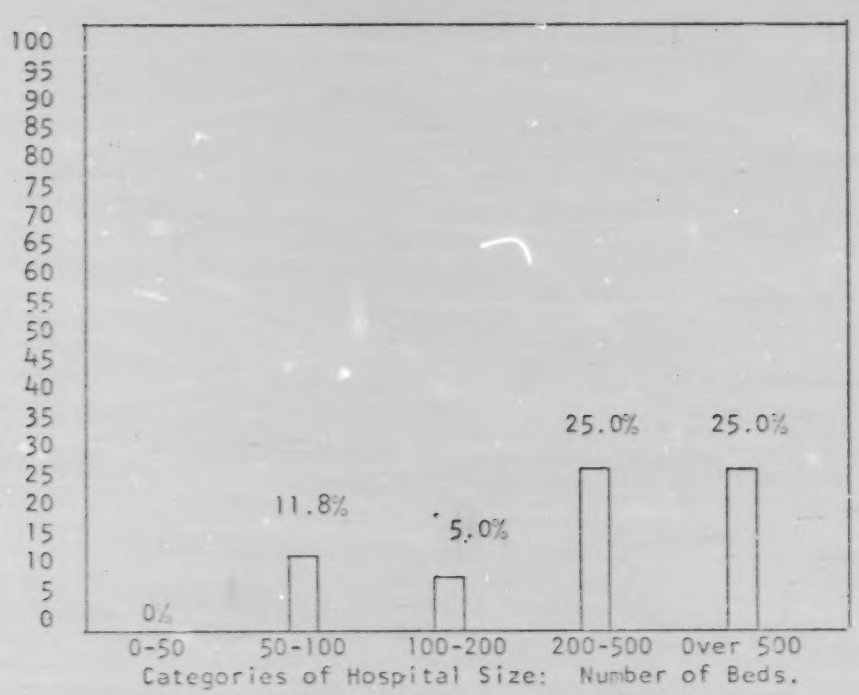


Figure 6. Percentage of two (2) or more BMIT individuals anticipated to be employed within the next year as a function of hospital size.

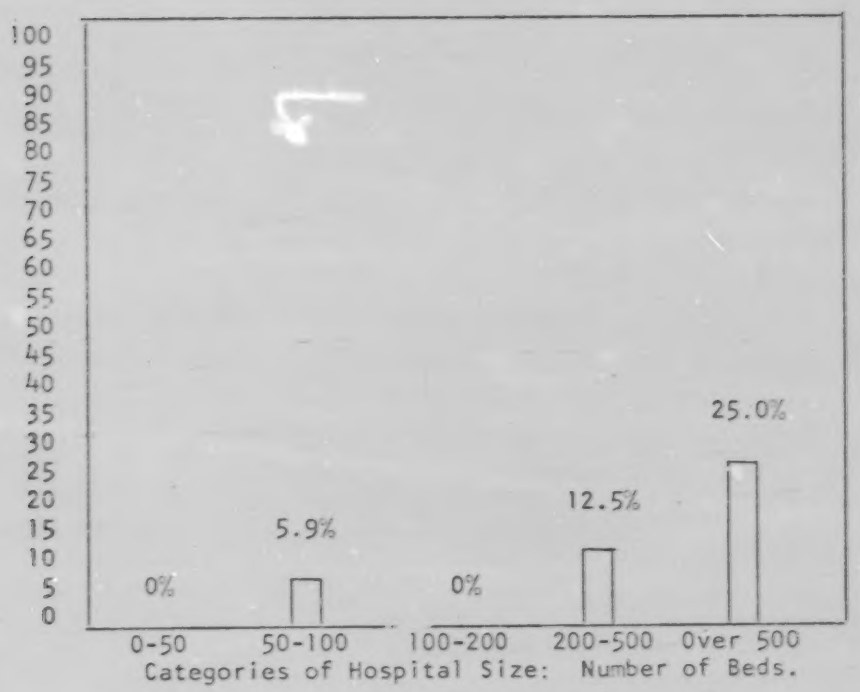


Figure 7. Percentage of three (3) or more BMIT individuals anticipated to be employed within the next year as a function of hospital size.

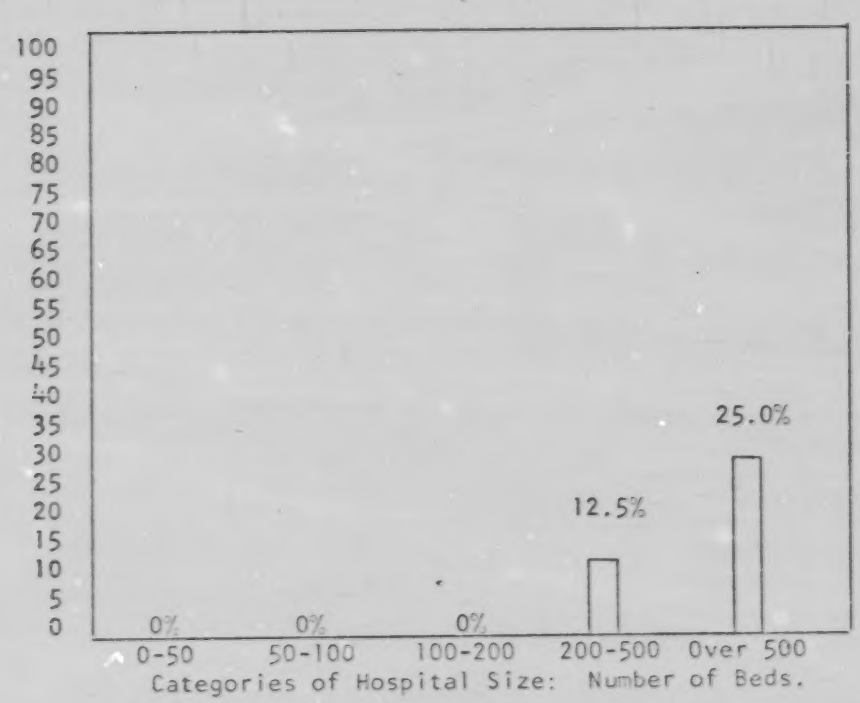


Figure 8. Percentage of four (4) or more BMIT individuals anticipated to be employed within the next year as a function of hospital size.

Item 3

How many BMIT individuals do you anticipate employing within the next five (5) years?

0-50 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	1	33.3%
Zero (0) individuals	1	33.3%
?	1	33.4%
Total	3	100.0%

50-100 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	1	5.9%
Zero (0) individuals	9	52.9%
Two (2) individuals	2	11.8%
?	5	29.4%
Total	17	100.0%

100-200 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	1	5.0%
Zero (0) individuals	3	15.0%
One (1) individual	9	45.0%
Five (5) individuals	1	5.0%
?	6	30.0%
Total	20	100.0%

200-500 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	2	12.5%
Zero (0) individuals	3	18.8%
One (1) individual	5	31.2%
Two (2) individuals	2	12.5%
Three (3) individuals	1	6.2%
Four (4) individuals	1	6.2%
Eight (8) individuals	1	6.3%
?	1	6.3%
Total	16	100.0%

Over 500

Categories of Answers	Number of Responses	Percentage
One (1) individual	2	50.0%
Five (5) individuals	1	25.0%
Eight (8) individuals	1	25.0%
Total	4	100.0%

Item 5

What is the educational level presently required of a BMI technician for initial employment at your facility?

0-50 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	2	66.7%
Not Applicable	1	33.3%
Total	3	100.0%

50-100 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	10	58.8%
Not Applicable	4	23.5%
B.S. in Med. Tech. or related area	1	5.9%
Licensed Med. Tech. Only	1	5.9%
College grad. with state license	1	5.9%
Total	17	100.0%

100-200 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	7	35.0%
Not Applicable	4	20.0%
No fixed requirements	4	20.0%
High sch. & med. asst. sch.	1	5.0%
Clinical lab tech. license	1	5.0%
Two yrs college; 2 yrs. exp.	1	5.0%
B.S. degree	1	5.0%
College degree; 1 yr. internship	1	5.0%
Total	20	100.0%

200-500 Beds

Categories of Answers	Number of Responses	Percentage
No Answer	11	68.8%
Electronics background	1	6.2%
High school plus experience	1	6.2%
High school plus military or trade school experience	1	6.2%
Four yrs. tech. sch.; 2 yrs. on-the-job-training	1	6.3%
Average 15 yrs. tech. exp.	1	6.3%
Total	16	100.0%

Over 500 Beds

Categories of Answers	Number of Responses	Percentage
Two-Four yrs. college	1	25.0%
Two yrs. college plus four yrs. field experience	1	25.0%
Civil service exp.; college exp. may be substituted for some experience	1	25.0%
B.S. degree	1	25.0%
Total	4	100.0%

Item 8

Would you be interested in employing an individual who has completed a program in BMIT?

0-50 Beds

Categories of Answers	Number of Responses	Percentage
Yes	0	0.0%
Maybe	3	100.0%
No	0	0.0%
Total	3	100.0%

50-100 Beds

Categories of Answers	Number of Responses	Percentage
Yes	4	23.5%
Maybe	6	35.3%
No	7	41.2%
Total	17	100.0%

100-200 Beds

Categories of Answers	Number of Responses	Percentage
Yes	4	20.0%
Maybe	13	65.0%
No	3	15.0%
Total	20	100.0%

200-500 Beds

Categories of Answers	Number of Responses	Percentage
Yes	4	25.0%
Maybe	9	56.2%
No	3	18.8%
Total	16	100.0%

Over 500 Beds

Categories of Answers	Number of Responses	Percentage
Yes	4	100.0%
Maybe	0	0.0%
No	0	0.0%
Total	4	100.0%

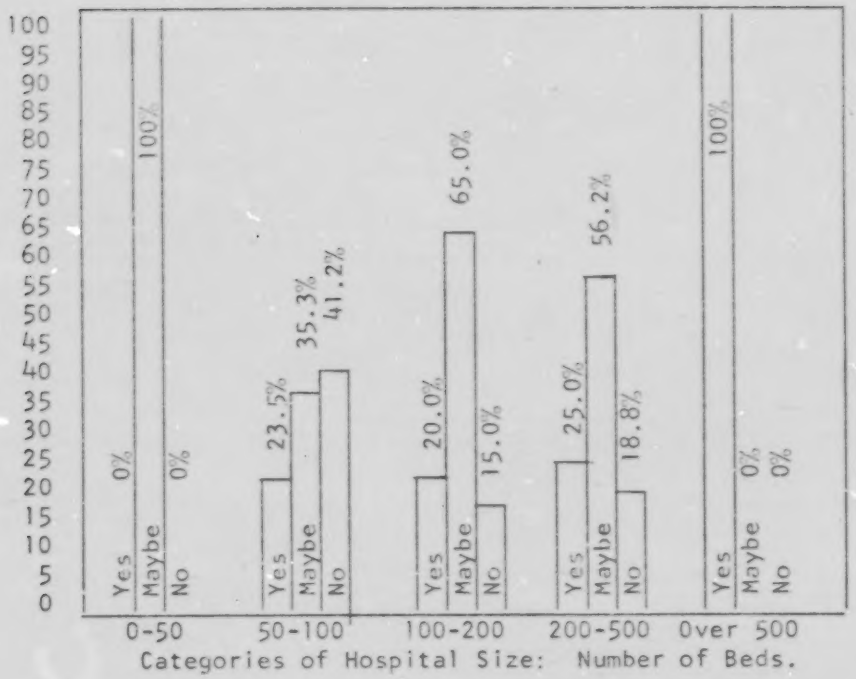


Figure 9. Percentage of "Yes", Maybe", and "No" responses to the question: "Would you be interested in employing an individual who has completed a program in BMIT?", as a function of hospital size.

Item 9

Would you encourage your present employees to enroll in a BMIT program if it existed?

0-50 Beds

Categories of Answers	Number of Responses	Percentage
Yes	2	66.7%
Maybe	0	0.0%
No	0	0.0%
No Answer	1	33.3%
Total	3	100.0%

50-100 Beds

Categories of Answers	Number of Responses	Percentage
Yes	13	76.4%
Maybe	0	0.0%
No	2	11.8%
No Answer	2	11.8%
Total	17	100.0%

10[illegible]200 Beds

Categories of Answers	Number of Responses	Percentage
Yes	13	65.0%
Maybe	4	20.0%
No	3	15.0%
No Answer	0	0.0%
Total	20	100.0%

200-500 Beds

Categories of Answers	Number of Responses	Percentage
Yes	12	75.0%
Maybe	1	6.4%
No	3	18.6%
No Answer	0	0.0%
Total	16	100.0%

Over 500 Beds

Categories of Answers	Number of Responses	Percentage
Yes	3	75.0%
Maybe	0	0.0%
No	1	25.0%
No Answer	0	0.0%
Total	4	100.0%

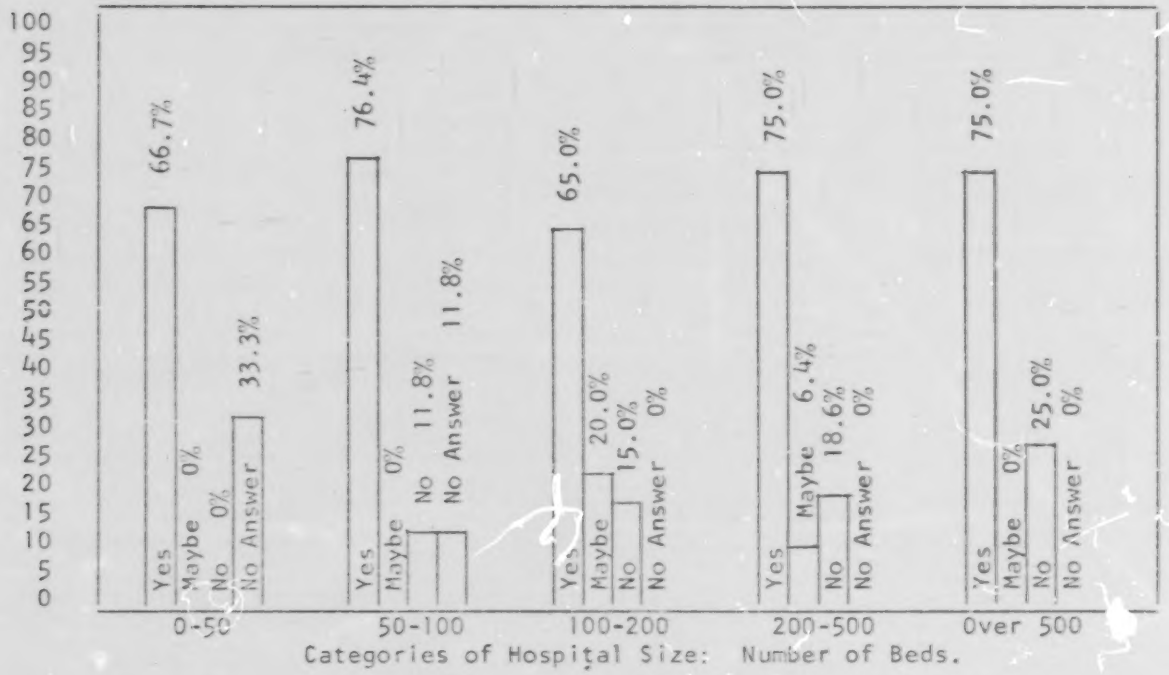


Figure 10. Percentage of "Yes", "Maybe", "No", and "No Answer" responses to the question: "Would you encourage your present employees to enroll in a BMIT program if it existed?", as a function of hospital size.

Item 10

Are any of your employees presently attending some type of formalized BMIT training program?

0-50 Beds

Categories of Answers	Number of Responses	Percentage
Yes	0	0.0%
Maybe	0	0.0%
No	3	100.0%
No Answer	0	0.0%
Total	3	100.0%

50-100 Beds

Categories of Answers	Number of Responses	Percentage
Yes	0	0.0%
Maybe	0	0.0%
No	16	94.1%
No Answer	1	5.9%
Total	17	100.0%

100-200 Beds

Categories of Answers	Number of Responses	Percentage
Yes	0	0.0%
Maybe	0	0.0%
No	20	100.0%
No Answer	0	0.0%
Total	20	100.0%

200-500 Beds

Categories of Answers	Number of Responses	Percentage
Yes	2	12.5%
Maybe	0	0.0%
No	14	87.5%
No Answer	0	0.0%
Total	16	100.0%

Over 500 Beds

Categories of Answers	Number of Responses	Percentage
Yes	1	25.0%
Maybe	0	0.0%
No	2	50.0%
No Answer	1	25.0%
Total	4	100.0%

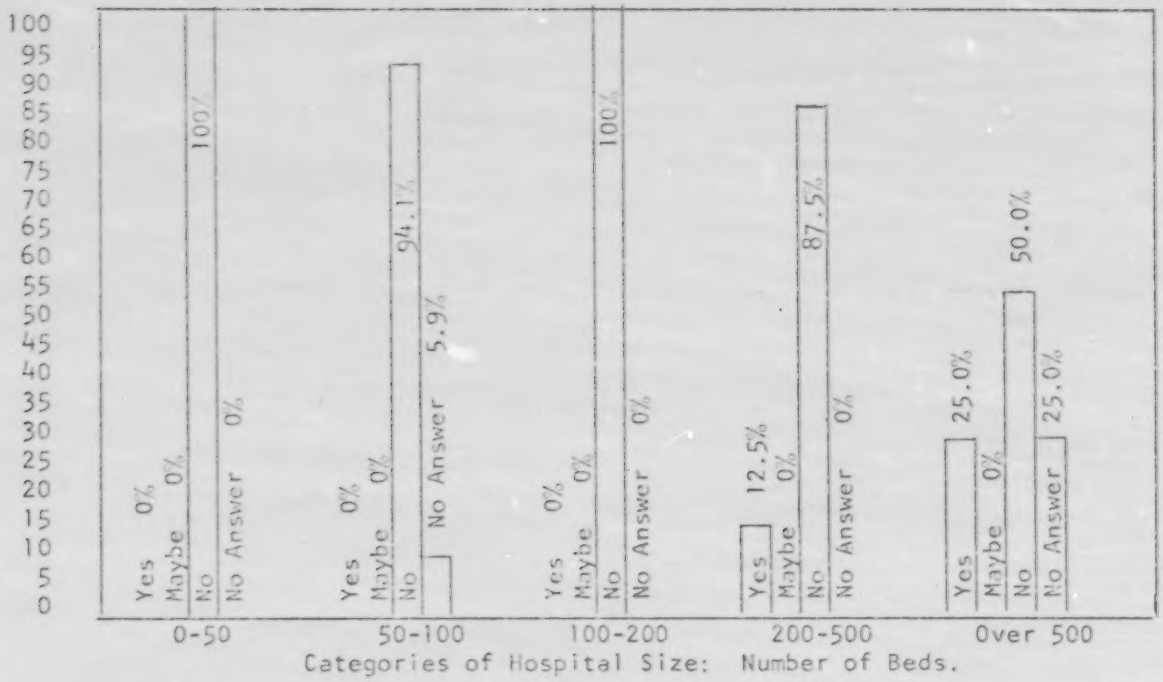


Figure 11. Percentage of "Yes", "Maybe", "No", and "No Answer" responses to the question: "Are any of your employees presently attending some type of formalized BMIT training program?", as a function of hospital size.

Item 11

Please rate the attached outline of a proposed introductory course.

0-50 Beds

Categories of Answers	Number of Responses	Percentage
Excellent	0	0.0%
Satisfactory	2	66.7%
Not Satisfactory	0	0.0%
No Answer	1	33.3%
Total	3	100.0%

50-100 Beds

Categories of Answers	Number of Responses	Percentage
Excellent	8	47.0%
Satisfactory	6	35.3%
Not Satisfactory	0	0.0%
No Answer	3	17.7%
Total	17	100.0%

100-200 Beds

Categories of Answers	Number of Responses	Percentage
Excellent	5	25.0%
Satisfactory	10	50.0%
Not Satisfactory	0	0.0%
No Answer	5	25.0%
Total	20	100.0%

200-500 Beds

Categories of Answers	Number of Responses	Percentage
Excellent	5	31.2%
Satisfactory	8	50.0%
Not Satisfactory	0	0.0%
No Answer	3	18.8%
Total	16	100.0%

Over 500 Beds

Categories of Answers	Number of Responses	Percentage
Excellent	0	0.0%
Satisfactory	3	75.0%
Not Satisfactory	0	0.0%
No Answer	1	25.0%
Total	4	100.0%

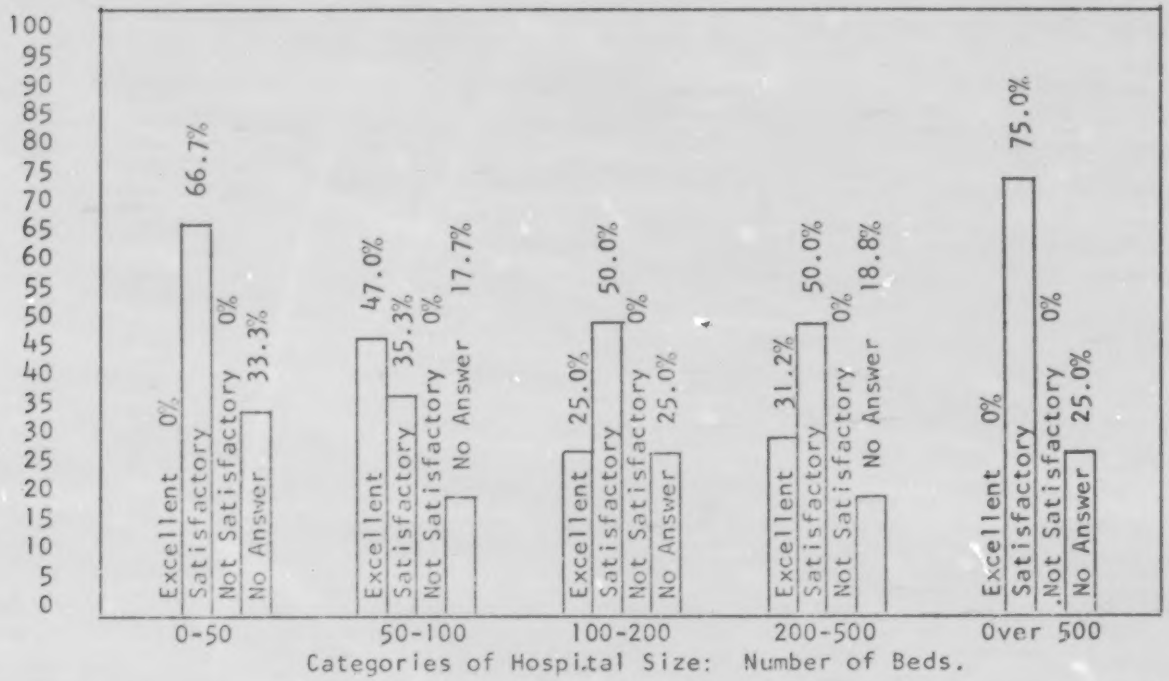


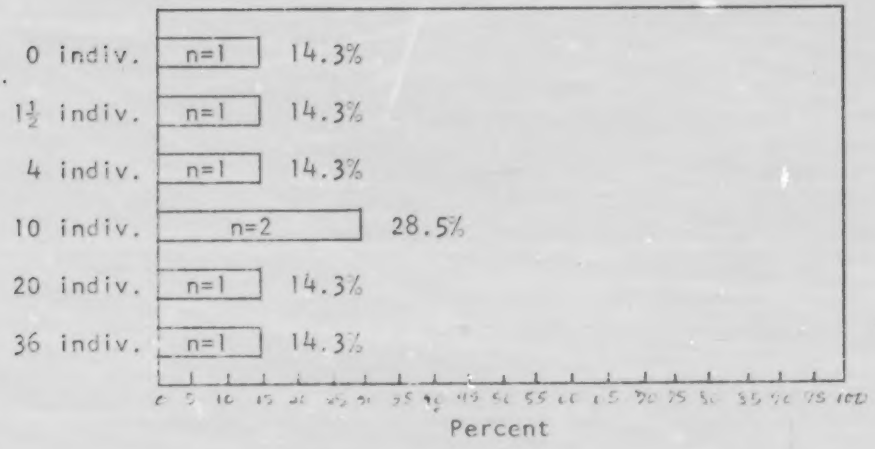
Figure 12. Percentage of "Excellent", "Satisfactory", "Not Satisfactory", and "No Answer" responses to the question: "Please rate the attached outline of a proposed introductory course.", as a function of hospital size.

Analysis 3: Items 1 through 12 across those 7 manufacturers (of bio-med instrumentation) who returned a completed questionnaire.

Item 1

How many individuals do you presently employ in the area of Bio-Med Instrumentation Technology (BMIT)?

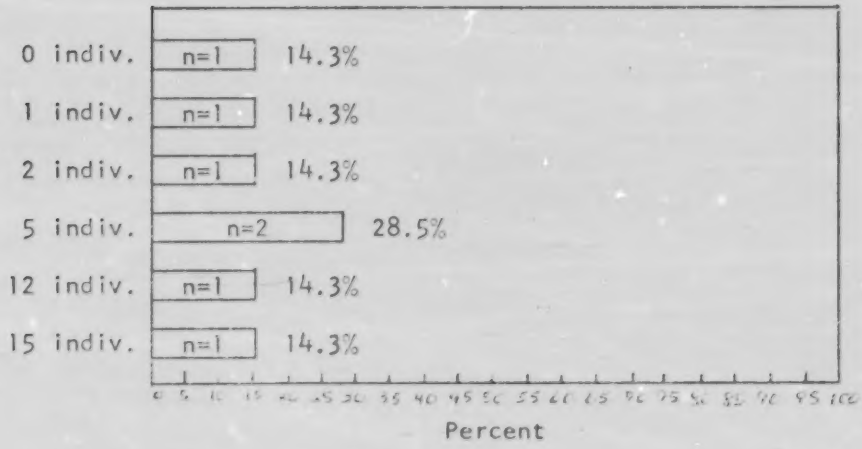
Categories of Answers	Number of Responses	Percentage
Zero (0) individuals	1	14.3%
One & one-half ($1\frac{1}{2}$) indiv.	1	14.3%
Four (4) individuals	1	14.3%
Ten (10) individuals	2	28.5%
Twenty (20) individuals	1	14.3%
Thirty-six (36) individuals	1	14.3%
Total	7	100.0%



Item 2

How many do you anticipate employing within the next year?

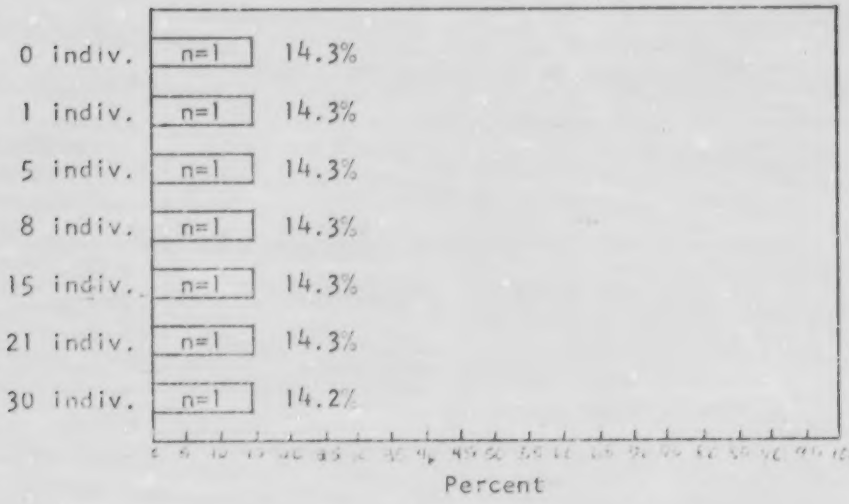
Categories of Answers	Number of Responses	Percentage
Zero (0) individuals	1	14.3%
One (1) individual	1	14.3%
Two (2) individuals	1	14.3%
Five (5) individuals	2	28.5%
Twelve (12) individuals	1	14.3%
Fifteen (15) individuals	1	14.3%
Total	7	100.0%



Item 3

How many within the next five years?

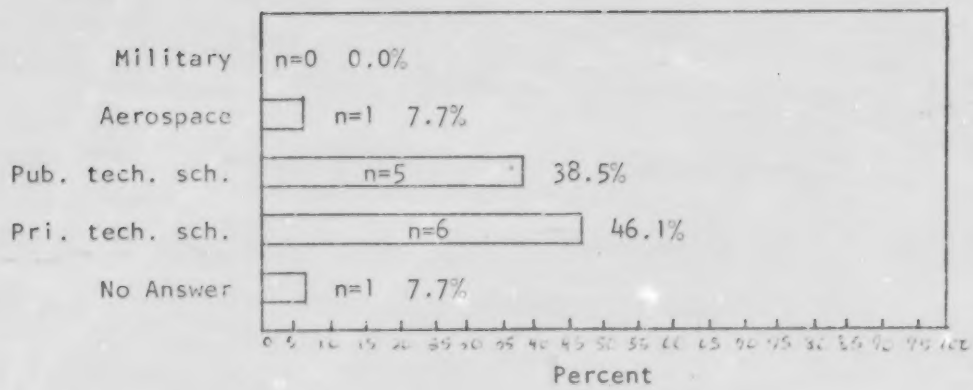
Categories of Answers	Number of Responses	Percentage
Zero (0) individuals	1	14.3%
One (1) individual	1	14.3%
Five (5) individuals	1	14.3%
Eight (8) individuals	1	14.3%
Fifteen (15) individuals	1	14.3%
Twenty-one (21) individuals	1	14.3%
Thirty (30) individuals	1	14.2%
Total	7	100.0%



Item 4

Present sources of employable individuals?

Categories of Answers	Number of Responses	Percentage
Military	0	0.0%
Aerospace	1	7.7%
Public tech. schools	5	38.5%
Private tech. schools	6	46.1%
No Answer	1	7.7%
Total	13	100.0%



Item 5

What is the educational level presently required of a BMI technician for initial employment at your facility?

No Answer - 1

"Two to three years of college" - 1

"A.A. degree in electronics" - 1

"General equivalent to A.A. degree" - 1

"Three semesters of college" - 1

"Two years of electronics theory" - 1

"Electronics background heavy in solid state" - 1

Occupational skills needed by a BMI technician at your facility. Please check any of the following items that are applicable.

Patient Monitoring Equipment:
*(Percent of total responses 39.1%)

	Number of Responses	Percentage
Installation	5	18.6%
Operation	4	14.8%
Minor Cal. & Adjustment	4	14.8%
Major Cal. & Adjustment	4	14.8%
Minor Equip. Repair & Maint.	4	14.8%
Major Equip. Repair & Maint.	5	18.5%
No Answer	1	3.7%
	27	100.0%

Clinical Laboratory Equipment:
*(Percent of total responses 24.6%)

	Number of Responses	Percentage
Installation	3	17.6%
Operation	2	11.8%
Minor Cal. & Adjustment	2	11.8%
Major Cal. & Adjustment	3	17.6%
Minor Equip. Repair & Maint.	2	11.8%
Major Equip. Repair & Maint.	4	23.5%
No Answer	1	5.9%
	17	100.0%

Research Instrumentation: *(Percent of total responses 36.3%)

	Number of Responses	Percentage
Installation	4	16.0%
Operation	4	16.0%
Minor Cal. & Adjustment	4	16.0%
Major Cal. & Adjustment	4	16.0%
Minor Equip. Repair & Maint.	4	16.0%
Major Equip. Repair & Maint.	4	16.0%
No Answer	1	4.0%
	25	100.0%

Item 7

What are some of the specific problems presently encountered by BMI Technicians employed at your facility?

No Answer - 2

"Their training is weak and some have a hard time communicating with customers" - 1

"There is such a wide variety of gear that it is very hard to specialize even though BMI techs have a great deal of responsibility in the area of patient safety" - 1

"Lack of specific knowledge pertaining to Bio-Med equipment" - 1

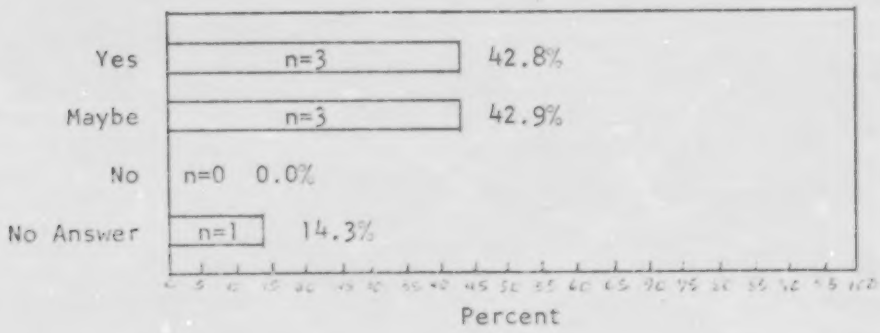
"Lack of ability to think things through logically" - 1

"Getting drawing from the company" - 1

Item 8

Would you be interested in employing an individual who has completed a program in BMIT?

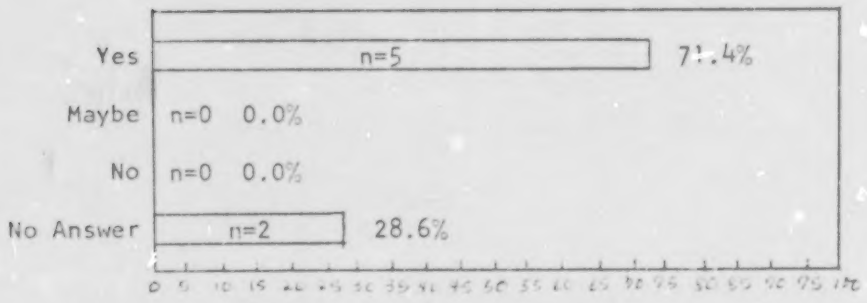
Categories of Answers	Number of Responses	Percentage
Yes	3	42.8%
Maybe	3	42.9%
No	0	0.0%
No Answer	1	14.3%
Total	7	100.0%



Item 9

Would you encourage your present employees to enroll in a BMIT program if it existed?

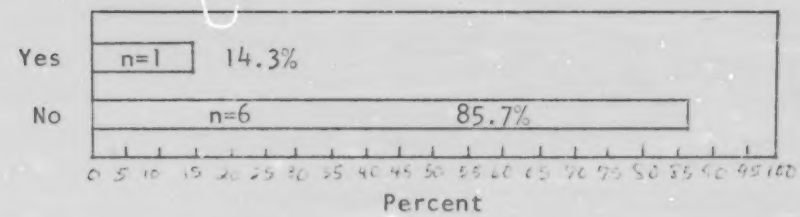
Categories of Answers	Number of Responses	Percentage
Yes	5	71.4%
Maybe	0	0.0%
No	0	0.0%
No Answer	2	28.6%
Total	7	100.0%



Item 10

Are any of your employees presently attending some type of formalized BMIT training program?

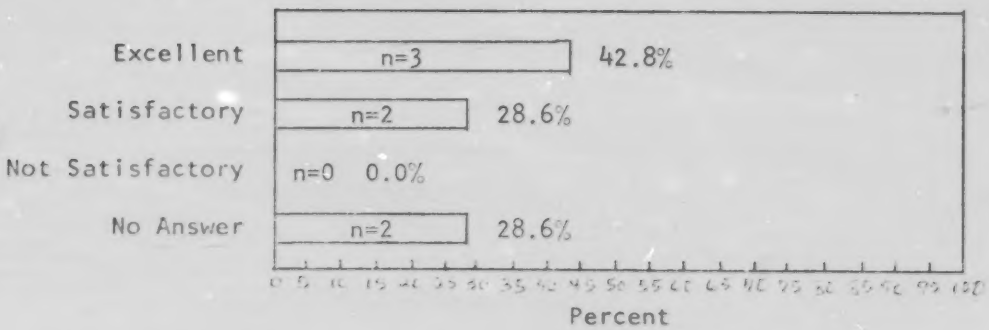
Categories of Answers	Number of Responses	Percentage
Yes	1	14.3%
No	6	85.7%
Total	7	100.0%



Item 11

Please rate the attached outline of a proposed introductory course.

Categories of Answers	Number of Responses	Percentage
Excellent	3	42.9%
Satisfactory	2	28.6%
Not Satisfactory	0	0.0%
No Answer	2	28.6%
Total	7	100.0%



Item 12

Please suggest major courses in the Bio-Medical area and related fields such as electronics which should make up the major two year program. (The responses to this question may be found on the following pages.)

Paul Lukas
Service Supervisor
Siemens Corp.
16415 S. Avalon Blvd.
Gardena, CA 90248
327-5801

NO ANSWER

Jerry Puder
B.M.E.T.
Physicians Automated Laboratory
2801 "H" Street
Bakersfield, CA
(805) 325-0744

NO ANSWER

John W. Lotz
Branch Area Service Supervisor
Perkin-Elmer Corp.
1625 E. Edinges
Santa Ana, CA
(714) 835-9279

Electronics: Basic, include using test equipment also some solid state, how to trouble shoot same.

Communication: Oral, human relations.

Operation of: Learn how they operate, run test on there equipment to check performance.

John C. Tibbets
Western Regional Personnel Manager
Honeywell Information Systems Inc.
5959 W. Century Blvd.
670-7500

We use no medical electronic technicians.

Glenn E. Hardin
Medical Service Manager
Hewlett-Packard
3939 Lankershim
N. Hollywood, CA 91604
(213) 877-1282

1. Digital familarization, such as operating knowledge of computer-based monitoring, cathlas scintigraphic & interpretive EKG systems.

2. Basic nuclear med applications & practice as in scintigraphic analysis.

3. Pursuant to the above, the prerequisites should presuppose & solid digital theory & troubleshooting content.

4. Along with your proposed X-ray portion, a good background in safety & various federal & state codes should be furnished.

5. The course, as you have outlined it implies post-training hire by hospitals only. Possibly an "industrial" option might be substituted such as: substitute "professionalist in customer service "F" public relations. These could replace or augment your "A" hospital orientation.

Huey K. Lee
Asst. Manager, Customer Service
Could Inc, Medical Systems Div.
384 Santa Trinita Avenue
Sunnyvale, CA 94086
(408) 739-8880 ext. 251

The BMIT must also have a strong background in digital and analog circuites, in addition to a solid background in semi-conductors & integrated circuit devices; e.g. operational amplifiers, gates, flipflops, and FETS, MDS-CMOS, etc., etc.

I will be very pleased to serve on your advisory board. I have a BSEE degree from San Jose State Univ. (1963), did graduate work in Univ. of Santa Clara. For the last $2\frac{1}{2}$ yrs I have been involved in organizing & instructing our BMIT's in the company, and those of our customers (hospitals).

P.S. I am also the vice chairman of the IEEE-EMB group in the San Francisco section.

Donald L. Emmons
Manager New Products
Birtcher Corp.
4371 Valley Blvd.
Los Angeles, CA 90032

Blood pressure & flow; respiration & temperature.

Summary and Conclusions

Analysis I

1. Concerning future employment opportunities in the area of BMIT it was found that the majority (83%) of the hospital respondees expect BMIT employment to remain the same during the next year, however within the next five years 35% expect employment opportunities to increase while none expect a decrease in BMIT employment.
2. For those that employed BMIT types the "sources of employable individuals" varied about evenly between military (12%), aerospace (11%), public technical schools (14%), and private technical schools (12%).
3. The reaction to "What is the educational level presently required of a BMIT technician for initial employment at your facility" was extremely varied and would lead one to conclude that at present there are no standardized requirements.
4. Concerning occupational skills needed by BMI technicians it was found that clinical laboratory equipment was the most prevalently serviced followed by patient monitoring equipment and research instrumentation.
5. Twenty-six percent (26%) of the respondees indicated they would be interested in employing an individual who has completed a program in BMIT, fifty-two percent (52%) "Maybe".

6. The majority of the respondees (72%) would encourage their present employees to enroll in a BMIT program if it existed.
7. Present employees are not attending any type of formalized BMIT training program.
8. Thirty percent (30%) rated the outline of the proposed introductory course as "Excellent", 48% rated it "Satisfactory" and, 22% did not answer.

Analysis 2

1. The larger the hospital the more BMI technicians employed.
2. The larger the hospital the more BMIT employment was anticipated in the future.
3. Regardless of hospital size the educational level presently required of a BMIT was varied, and again would lead one to conclude that at present there are no standardized requirements.
4. There tended to be a direct relationship between interest in employing an individual who has completed a program in BMIT and hospital size.
5. The enthusiasm concerning whether encouragement would be given present employees to enroll in a BMIT program tended to be about the same (on the average the "Yes" responses accounted for over 70% of the responses) regardless of hospital size.
6. Only the large hospitals (200-500 and over 500 beds) indicated that any of their employees were presently attending some type of formalized BMIT training program.

7. All hospitals regardless of size rated the outline of the proposed introductory course as either "Excellent" or "Satisfactory".

Analysis 3

1. Concerning future employment opportunities in the area of BMIT it was found that the majority of the manufacturers expect BMIT employment to remain about the same during the next year, however they expect employment opportunities to increase during the next five years.
2. Sources of employable individuals for manufacturers were private technical schools (46%), public technical schools (37%), and aerospace (8%).
3. Educational level required varied from "electronics background heavy in solid state" to "two to three years of college". Thus it appears that at present there are no standardized educational requirements.
4. Concerning occupational skills needed by BMI technicians it was found that patient monitoring equipment was the most prevalently serviced followed by research instrumentation and clinical laboratory equipment.
5. Forty-three percent (43%) of the manufacturers indicated they would be interested in employing an individual who has completed a program in BMIT, and forty-three percent (43%) indicated "Maybe".

6. The majority of the manufacturers (72%) would encourage their present employees to enroll in a BMIT program if it existed.
7. Only fourteen percent (14%) of present employees are attending any type of formalized BMIT training program.
8. Forty-three percent (43%) rated the outline of the proposed introductory course as "Excellent", twenty-nine (29%) gave it a satisfactory rating, and 29% did not answer.

APPENDIX A

BEST COPY AVAILABLE

Cerritos College

Date

Mr. John Doe
Chief Technician
John Doe Hospital
John Doe Street
Los Angeles, CA

Dear Mr. Doe:

We are presently engaged in preliminary planning for a curriculum in Bio-Med instrumentation at our two-year community college. In this regard, it would be very helpful if you would please take a few minutes of your time to answer the questions on the enclosed questionnaire and return it to us in a self-addressed, stamped envelope. The proposed curriculum might start with a general course in introduction to Bio-Med Instrumentation. Highlights for such a proposed course are attached for your evaluation. Students would probably enter the program after completing the first year of our electronics program or with appropriate industrial experience and then work toward a certificate or a two-year A.A. degree program.

If you have any person in your community who might be interested in a program of this type, please let us know so that we may put them on our mailing list. In addition, if you would be interested in serving on an advisory board in this area or know someone who might, please indicate and we will be very happy to send notices of activities.

We will certainly appreciate your assistance. This information will better prepare us for evaluating the advisability of adding a Bio-Med Instrumentation program to our curriculum. Thank you, Mr. Doe, very much for your time and consideration.

Sincerel yours,

Gary F. Schaumburg
Director of Research

GFS/rr

Enclosures

CERRITOS COLLEGE - BIO-MED INSTRUMENTATION TECHNOLOGY

COURSE DESCRIPTION

A. The source and nature of electrophysical phenomenon, as it relates to instrumentation, will be explored. The principles of laboratory and theraputic equipment will be discussed. This will be followed by a study of the practical application of technology to the maintenance, repair and calibration of analysis and patient monitoring equipment. Hospital safety and the problems peculiar to the Intensive Care Unit will also be covered.

B. Three hours lecture, three hours laboratory; four units.

COURSE OBJECTIVES

A. Provide an overview of the field of Bio-Medical Instrumentation for the electronics technician working in industry or for a student in an advanced community college electronics program.

B. Provide a general understanding for the situations the student may expect in the maintenance repair and calibration of bio-medical instrumentation equipment.

REQUIRED BACKGROUND OR EXPERIENCE

A. Prerequisites: Three semesters of electronics(AD; DC; and Circuit Analysis) or concurrent enrollment in the third semester course.

DESCRIPTION OF CONTENT

A. Hospital Orientation

1. Communication between technicians and medical staff
2. Organizational responsibilities

B. Bio-Medical Terminology

1. Medical terms
2. Roots, prefixes and suffixes

C. Sources of Bio-electric Potentials

1. Heartbeat
2. Brain Activity
3. Muscle movement

D. Research and Clinical Laboratory Equipment

1. PH measurement
2. Spectrophotometry
3. Blood Cell counting
4. Flame Photometry
5. Continuous flow analysis
6. Centrifuges
7. Other laboratory equipment

E. Patient Monitoring Equipment

1. ECG/EEG
2. Defibrillators
3. Stimulators
4. Pacemakers
5. ICU Monitoring equipment
6. Ventilators
7. Coronary
8. Pediatric

F. Patient Diagnostic Equipment

1. X-Ray
2. Pulmonary
3. Nuclear
4. Catheter lab

G. Measuring Equipment

1. Counters
2. Oscilloscopes
3. Signal generators
4. Recorders

H. Patient Safety

CERRITOS COLLEGE NORWALK, CALIFORNIA JULY, 1973

Bio-Med Instrumentation Technologist Questionnaire

1. How many individuals do you presently employ in the area of Bio-Med Instrumentation Technology (BMIT)?

   _____ Individuals

2. How many do you anticipate employing within the next year?

   _____ Individuals

3. How many within the next five years?

   _____ Individuals

4. Present sources of employable individuals?

   _____ Military
   _____ Aerospace
   _____ Public technical schools
   _____ Private technical schools

5. What is the educational level presently required of a BMI technician for initial employment at your facility? _____

6. Occupational skills needed by a BMI technician at your facility. Please check any of the following items that are applicable.

Patient Monitoring Equipment

_____ Installation
_____ Operation
_____ Minor calibration & adjustment
_____ Major calibration & adjustment
_____ Minor equipment repair & maintenance
_____ Major equipment repair & maintenance

Clinical Laboratory Equipment

_____ Installation
_____ Operation
_____ Minor calibration & adjustment
_____ Major calibration & adjustment
_____ Minor equipment repair & maintenance
_____ Major equipment repair & maintenance

Research Instrumentation

_____ Installation
_____ Operation
_____ Minor calibration & adjustment
_____ Major calibration & adjustment
_____ Minor equipment repair & maintenance
_____ Major equipment repair & maintenance

7. What are some of the specific problems presently encountered by BMI technicians employed at your facility? _____

_____

_____

8. Would you be interested in employing an individual who has completed a program in BMIT?

   _____ Yes
   _____ Maybe
   _____ No
   Comment: _____

_____

9. Would you encourage your present employees to enroll in a BMIT program if it existed?

   _____ Yes
   _____ No
   Comment: _____

_____

10. Are any of your employees presently attending some type of formalized BMIT training program?

_____ Yes
_____ No
If "Yes", where is the training program located?: _____

11. Please rate the attached outline of a proposed introductory course.
EXCELLENT SATISFACTORY NOT SATISFACTORY

12. Please suggest major courses in the Bio-Medical area and related fields such as electronics which should make up the major two year program.

Your Name _____

Position or Title _____

Name of Establishment _____

Address _____

Telephone _____

BEST COPY AVAILABLE

Cerritos College

Date

Mr. John Doe
Chief Technician
John Doe Hospital
John Doe Street
Los Angeles, CA

Dear Mr. Doe:

A couple of weeks ago you hopefully received a questionnaire concerning the development of an educational program in Bio-Medical Instrumentation Technology.

We are particularly desirous of obtaining your response to the items on the questionnaire since we feel that they will contribute significantly toward solving some of the problems we face in the implementation of this type of program.

It will be appreciated if you would take a few minutes of your time to complete the questionnaire and return it in the stamped envelope that was enclosed.

Other phases of our attempt to develop a curriculum in Bio-Medical Instrumentation Technology cannot be carried out until we complete analysis of the questionnaire data.

Sincerely yours,

Gary F. Schaumburg
Director of Research

GFS/lh

APPENDIX B

Comments in response to item #12 on BMIT Survey: "Please suggest major courses in the Bio-Medical Area and related fields such as electronics which should make up the major two year program."

Bruce E. Mount
Dir. Electronic Instrumentation Dept.
City of Hope Medical Center
1500 E. Duarte Rd., Duarte, CA 91010
(213) 359-8111

- Physics
- Chemistry, with some emphasis on ph electrodes, batteries, holf-cell potentials, etc.
- Math through trigonometry & algebra (1 yr calculus if possible)
- Physiology
- Electronics Fundamentals
- TV repair through color
- Instrumentation fundamentals with strong emphasis on transducus (pressure, force, diplacement, acoustic, vibration, etc.)
- Analytical & scientific instrumentation principles

Mrs. L. Koesling
Chief Technologist
Memorial Hospital of Panorama City
14850 Roscoe Blvd., Panorama City, CA
787-2222

1. Working principles behind each piece of equipment
2. Electronic components in each equipment
3. Signs of instruments not working at peak efficiency and methods of correcting this
4. Courses should be offered to med. tech. nurses and other hospital and laboratory personnel as supplemental to their knowledge since it is they who use the equipment in performing their tests.

A bio medical technician is of limited use as an employer unless his knowledge incompasses all equipment and even these I would think only a service organization would utilize such a person or perhaps a very large hospital that does not use outside help for maintenance. Just to know the equipment and its use is not quite enough. Since your program lacks details - Question 11 cannot be answered.

Alexander Thom
Dir. Plant Services
Daniel Freeman Hospital
333 N. Prairie Ave., Inglewood, CA
672-0112

Electronic & mechanical aptitude. The mental capacity and ability to work with the tools.

Robert D. Gordon, M.T. (ASCP) M
Chief Technologist
Lompoc Hospital District
508 E. Hickory Avenue
RE6-1201

Troubleshooting auto analyzers. I would be most interested in serving on an advisory board if you feel someone in my capacity would be of any value to you.

Ronald Principé
Chief Med. Lab. Technologist
Simi Valley Doctor's Hospital
1850 Heywood St., Simi Valley, CA 93065
(805) 527-9383 ext. 219

1. Biology - 1 yr.
2. Physics - 1 yr.
3. Advanced math

Elwood L. Dewig
Dept. Head, Bio-med Engineering
U.C.L.A. Hospital
10833 LeConte, L.A., CA 90024
825-5865

Should be "heavy" in hands on operation of pressure monitoring, with possibly a simulator type dynamic pressure system to implement. Some of the items marked with an "X" would seem to be outside the normal realm of BMI activities within the realm of experience at this large hospital. Might be different for small hospital, however.

Sylvia Velasco
Chief Tech.
Fox Hills Hospital Lab
5525 W. Slauson Avenue, L.A., CA
(213) 645-2110 ext. 246

Our field of interest is the laboratory and equipment pertinent to the lab. Your program, although it involves lab equipment, is more all-round hospital oriented.

Robert F. Kinkaid
Chief Lab Technologist
Santa Ynez Valley Hospital
P.O. Box 228
(805) 688-6431

Items A thru C good. Possibly Items D & G attempt to cover too much for a one semester course. Due to OSHA. Item H might need more time. Data processing with more utilization of small units - perhaps some time should be devoted to this. Generally - looks good - I hope it works out, it is needed.

Twyla Lane
Chief Technologist
Hawthorne Comm. Hospital
11711 Grevillea, Hawthorne, CA 90250
973-1711

If all suggested courses (description of contents) were well covered, plan appears adequate. Suggest special training on particular instruments, example: Coulter (Blood cell counters); Nycec Mark X; Technicon; Hewlett Packard, EKG/patient monitor, etc.; Instrumentation laboratories; Bechman; Perkin Elmer; Corning; Turner, etc, etc.

Class in setting up good preventative maintelle programs for entire hospital, lab, patient monitoring equipment, x-ray. Fell that 2 years may not be sufficient time to cover such a broad field. Suggest possibility of specialize fields, such as lab instrumentation, x-ray, etc.

Masaru Kameya
Chief Med. Tech. & Education Coor.
South Bay Hospital Lab
514 N. Prospect Ave., Redondo Beach, CA 90277
(213) 376-9474 ext. 537

From the chief technologist point of view these students should have a year of chemistry, physics, and some biological science background to understand the use, purpose and applications for the instruments.

Course objective "B" would be ideal for Medical Technologist for research an clinical laboratory equipment plus measuring equipments in your proposed program.

Allen Lan
Lab Supr.
Comm. Hosp. Gardena
1246 W. 155th Street
323-5330

Appear to be a very complete and thorough program - any addition would probably be an overload or the students efforts.

Mrs. Jo Thiessen
Chief Medical Technologist
Methodist Hospital of So. Calif.
300 W. Huntington Dr., Arcadia, CA
445-4441

Students should have a sound mathematical background and the ability to perform calculations on a slide rule and/or simple calculator.

The laboratory here at the Methodist Hospital is operated by a group of M.D.'s who have labs throughout Southern Calif. They would be the ones to hire a Bio-Med Technologist and would probably hire one to circulate through the group.

There will always be a need for routine techs to know more about instrumentation but not to the extent of the Bio-Med Tech. Also they would need to have their classes available during "off" hours or as seminars on weekends.

Walter Steufling
Chief Lab Tech.
Beverly Hospital
309 W. Beverly Blvd., Montebello, CA 90640
726-1222 ext. 231

I would suggest contacting various repair service organizations as to their needs. Two are: Instra service -ph: (213) 247-6300 and; Scientific Products -ph: (714) 540-5320 -- ask for repair

Clara Brodsky
Chief Tech SCMPG
So. Calif. Permanent Med. Group
1526 N. Edgemont Avenue
667-4954

Basic Mechanics, Medical ethics.

Thane F. Prentiss
Bioanalyst - Chief Technologist
West Hills Hospital Laboratory
23023 Sherman Way, Canoga Park, CA
(213) 346-9550

Our concern in this laboratory is equipment directly related to laboratory testing procedures. The size of this laboratory (120 bed hospital) and therefore the numbers and types of equipment do not warrant a full-time BMI technician

A practical course in the maintenance of laboratory equipment for laboratory technologists would be of value. However, such a course given during the day, rather than at night would limit our participation.

Mr. Royce A. Luxton
Chief Technologist
St. Luke Hospital Lab
2632 E. Washington Blvd., Pasadena, CA
797-1141 ext. 277 or 278

Circuits & circuitry.

Virginia M. Shaw
Supr. Medical Technologist
Veteran Administration Hospital
16111 Plummer St., Sepulveda, CA 91343
894-8271 ext. 264

Addition of courses in Electronic Devices and Math for Electronics. Many laboratory instruments have computer print-out attachments. Those interested might wish to add this phase of repair to their program.

Mrs. Isabel Wallace
Asst. Lab Supervisor
Kaiser Hospital
1100 W. Pacific Coast Hwy., Harbor City, CA
325-5111 ext. 1021

Biology - Chemistry - Physics (BASIC)

Roscoe R. Schaffert
Biochemist
Wadsworth Hospital Center
Wilshire & Sawtelle Blvd., L.A., CA 90073
478-3711 ext. 4245

Gas chromatography, mass spectrometry, electropharesis, radio immuno electrophoresis and assay, neckar medicine.

John Grubb
Adm. Lab Tech
Presbytrian Intercommunity Hospital
12401 E. Washington Blvd., Whittier, CA
698-0811

Survey of physics and chemistry.

Robert M. Hooper M.T.
Chief Technologist
Goleta Valley Community Hospital Lab
351 So. Patterson Avenue: Santa Barbara, CA 93105
964-1416

Your program as presented seems adequate.

John J. Hess
Electronics Supervisor
Santa Barbara Cottage Hospital
320 W. Pueblo St., Santa Barbara, CA 93105

Physiology. A prerequisite course, or included courses is solid state circuitry (including integrated circuits) is a must. This should include basic logic terminology and schematic symbols, as well as trouble shooting techniques.

Mary Ashcavai
Chief Cl. Lab Technologist
John Wesley County Hospital
2826 S. Hope St., L.A., CA 90007
748-3111

Intermediate lab courses with more time devoted to the separate groups of equipment.

Herbert C. Witman
Adm. Chief Technologist - Laboratory
Northridge Hospital Foundation
18300 Roscoe Blvd., Northridge, CA 91324
(213) 885-8500

Course should also include other biological science courses - pertaining to patient care. This will give a foundation for better understanding or the applications, mal-functions, maintenance or instrumentation used in diagnosis and therapy of patients.

W. Frank Pervorse
Adm. Technologist
White Memorial Medical Center
1720 Brooklyn Avenue, L.A., CA 90033

1. Quality control.
2. Federal inspections standards. Necessary to indicate proper controls for accreditation.

Keith Wills
Chief Technologist
Pico Rivera Community Hospital
5216 S. Rosemead, Pico Rivera, CA
695-6755 or 0X2-0411

I am sure you would get a good response from medical technologists. The only problem would be the electronic prerequisites. Students who take this course should have some knowledge of routine laboratory biochemistry, hematology, bloodgases, etc.

Richard C. Pascual
Chief Medical Technologist
Kaiser Hospital
9400 E. Rosecrans, Bellflower, CA
920-4967

I am only qualified to evaluate equipment for repair in the clinical laboratory field. The greatest need as far as laboratories are concerned are in the field of flone photometers, blonegas analyzers, corull t&r counters, chloride titrators, notelson co^2 equipment, osmometers, kletts, coleman jr.

Danny Dunsworth
Chief Medical Technologist
Pacoima Memorial Lutheran Hospital
11600 Eldridge Ave., Lake View Terrace, CA 91342
896-1121 ext. 367

Clinical technology is presently going into a very sophisticated era. I would only suggest, in relation to the clinical laboratory, that the student kept up with the latest equipment being developed.

Possibly you could arrange with large companies such as Bechman Instruments, Instrument Laboratory, and Coleman to present their latest developments to your students.

Esmond M. Kronick
Chief Lab Technologist
Memorial Hospital of Gardena
1145 West Redondo Beach Blvd.
532-4200

Problem analysis and trouble shooting on specific equipment. Course in oktics and microscaky maintenance and repair. Course in instrument function and applications

Fred Nishi
Lab Supervisor
Hollywood Comm. Hospital
6245 DeLongpre Ave., Hollywood, CA 90028
462-2271

With the progress in automation, electrophoresis, and radio-immune assay, any knowledge of equipments used for these tests will be helpful.

Floyd H. Lord
Foreman, TMER Shop, Eng. Service
V.A. Hospital
5901 East 7th Street, Long Beach, CA 90801
(213) 498-1313 ext. 2396

As medical equipment repairmen, we are responsible for maintenance and repair of all technical medical equipment directly related to patient care. Mr. James, of Lab. Service asked me to answer your inquiry. He and I discussed the questions in general. We have an eight man TME repair shop. We do installation, major & minor repairs. Because of the complexity and sophistication of modern medical equipment, it is my thought that your electronics pre-requisite might be strengthened. Your course outline appears to be quite adequate otherwise. In a sense, we are of the opinion that practically all technicians could be grouped as general BMIT., in-as-much as any technician must do some minor adjustments in the routine operation of his equipment. The technician who is thoroughly versed in the operation, maintenance and repair would be your true BMET. We have found that the medical field of necessity, has had to be broken down into specialized fields such as: 1. X-Ray; 2. Lab; 3. Heart monitoring and nuclear med. I do not honestly believe that the required time element is anywhere near to being realistic. A two year course would be more desirable.

Patricia McCauley
Chief Technologist
St. Joseph Medical Center
Buena Vista & Alameda, Burbank, CA 91505
843-5111 ext. 2331

Dear Mr. Schaumburg:

Please forgive my not getting this questionnaire back to you sooner - vacation ☆ what not. I took the liberty of passing a copy of it along to an engineer friend of ours for his evaluation, and I think you'll hear from him.

We are very interested in your proposed program - medical technologists are woe-fully ignorant concerning basic electronics, and our first reaction in the face of major equipment breakdown is sheer, blind panic. So - please put us on your mailing list and keep us informed.

Roland K. Kiebel
Laboratory Director
Glendale Community Hospital
800 S. Adams; Glendale, CA 91205

"Computer basics & possible medical applications". This will be big in the near future & your courses could introduce those with aptitude to a new & probably lucrative field.

ie. 1. Problem oriented medical history charts
2. Instrument read out to charts
3. Filing & retrieve of information
4. etc.

Ralph P. Labostrie
Ch. Med. Lab Tech.
S.E. Doctors Hospital
5900 Pine Avenue, Maywood, CA
582-6131

I do not feel qualified to offer any suggestions in this area, since I am not familiar with BMIT. We do not have any employees in this capacity. Due to our small size we utilize a company to fill our needs in this area. However I do feel that their is a need in this area and your proposed program seems very thorough.

Ellen Honey
Chief Medical Technologist
Sherman Oaks Com. Hospital
4929 Van Nuys Blvd.
981-7111

Since most of the depts. in our hospital are specialized our tech. does not use all of the instruments. ICU nurses and CCU nurses are familiar with our type of equipment, pulmanary function techs are familiar with others. My only connection with this type of equipment is strictly EKG - operation only. We usually hire someone from one of the medical assistant schools when we have an opening.

Morris Rockenmacher, Ph.D.
Asst. Chief, Clinical Lab.
Rancho Los Amigos Hospital
Downey, CA 90242
(213) 869-0921 ext. 2760

Physiology, anatomy, biochemistry, & microbiology.
Please note that clinical laboratory equipment must be standardized by licensed (State of Calif.) clinical laboratory technologists.

Marietta Malatia
Chief Technologist
Imperial Hospital
11222 Inglewood Ave., Inglewood, CA
673-4200

I feel certainly a basic understanding of electronics and circuit boards should be included. Also an understanding of how the machines fit in with patient care and the need of the medical staff to have machines which are performing well in order that they may be doing a decent job.
Training, as expressed in your outline, on the major types of machines is extremely valuable. In this training it would be great if at least two manufactors machines were included in each area, such as, continuous flow analysis - Technicon's Auto Analyizers and Dades Mark X or other large chemistry analyizers.

(Mrs.) Ikulco Murakami
Chief Technologist
Viewpark Community Hospital Lab.
5035 Coliseum Street
295-6441

I would suppose that you would have (special) individual courses for D, E, F, & G, so that the Bio-Med Instrumentation graduate would be well-versed in all equipment.

Cletis R. Boen
Chief Medical Technologist
Bellwood General Hospital
10250 E. Artesia Blvd.
866-9028

A greater source of need and advice would come from the providers of these services:

1. Intra Service Instrumentation
2. Medical Surgical Supply

Orin E. Lewis
Chief Technologist
Lakewood General Hospital
5300 Clark St., Lakewood, Calif. 90712

Periodic up dating on new equipment.

The problem of a hospital employer doing this work, would be having a reliable source for parts for each of the several pieces of equipment., i.e. coulter & technicon who discourage other than their own service representatives.

Mr. G.M. Cory, M.T.
Chief Medical Laboratory Technologist
St. Francis Hospital Laboratory
601 E. Micheltorena St., Santa Barbara, CA
962-7661 ext. 232

The electronics area I have little knowledge of. This area I leave to others. In the area of laboratory medicine and the technics involved there I have more to offer. The following courses could be taught with existing personnel and I feel are essential to any person working in a health facility (laboratory).

1. Basics of use of spectrophotometric equipment (include fluoresence)
2. Basics of blood gas analysic
3. Basics of gas chromatography (toncology)
4. Basics of isotope methods
5. Basics of various uses of sequencial analysis
6. Basics of laboratory quality control program
7. Basics of understanding personal health hazards (as associated with work in laboratory area)
8. Basics of whole blood analysis (coulter model S, etc.)